

Solutes, Solvents, and Solubility



Introduction

One type of mixture that is used in chemistry is called a solution. You might think a solution is always a liquid; however, a solution can also be a solid or a gas. What exactly is a solution? What are some examples of solutions? What are some of the components of a solution? In this WebQuest, you will explore solutions and find the answers to these questions. You also will conduct a test to observe what happens to a solution over time. As you conduct this experiment, you will describe your observations and draw some conclusions about the solution's properties.

Task

Your job in this WebQuest is to learn more about solutions, solutes, and solvents. You will answer a set of questions about solutions to demonstrate what you have learned. Once you have conducted some research to increase your knowledge of solutions, you will perform a solubility experiment. First, you will select a solute and use water as the solvent. Then, you will use a scientific method that is modeled after investigations conducted by college students at Rice University, who studied the solubility of snack cakes.

Process

Read through the following set of questions before you begin your Internet research. As you explore each site, look for answers to the following questions.

1. What is a solution? What is an example of a solution?
2. How are solutes, solvents, and solubility related to solutions?
3. What are some factors that affect a solution's solubility?
4. Why is water called the universal solvent?
5. What is osmosis and how does it work?
6. How is reverse osmosis related to solutions? What is an example of the use of reverse osmosis?

Next, visit the following Web site to see how college students at Rice University applied scientific methods to conduct a solubility test with a snack cake.

<http://www.twinkiesproject.com/solubility.html>

After reviewing this experiment, select a solute to use to conduct your own solubility test. Choose an item that will not create any danger to you or other students. Consider items found at home or at school such as:

- slices of bread
- crackers
- facial tissues
- cotton balls
- leaves
- candies
- juices
- spices or seasonings

Use water as the solvent in your experiment. You can use tap water, distilled water, or bottled water. Collect the solute you need, water, and a clear container to conduct the solubility test in.

Create a *Solubility Test* worksheet to document the steps in your experiment. Test some different items and rate their solubility in water on a scale of 1 to 4. Include a table to report the data. Include sketches or photographs with your worksheet. Describe your findings and conclusions.

Resources

Use the Web sites provided here to find information that will help you answer questions about solutions and to gather information to use as you perform your solubility test. Keep in mind that not all Web sites are created for students. The material you find might be challenging. Look for information that will help answer the questions.

http://www.chem4kids.com/files/matter_solution.html

This page at chem4kids.com gives definitions for solutions and provides information about solutes, solvents, and solubility.

http://www.ec.gc.ca/water/en/nature/prop/e_solv.htm

Find out about properties of water at the Freshwater Web site, a part of the Environment Canada page.

<http://water.tamu.edu/structure.html>

Investigate the Water and the Earth's Resources page on the Texas A&M University's Web site to find out more about the structure and quality of water.

<http://www.infoplease.com/ce6/sci/A0845885.html>

This page at Infoplease.com defines some basic ideas related to solutions.

<http://www.infoplease.com/ce6/sci/A0861175.html>

Learn more about the characteristics of solutions by visiting this page at Infoplease.com.

<http://www.learnchem.net/tutorials/solu.shtml>

Visit this page, written by Jason Doub, at the learnchem.net site to find out general information about solutions and to read about different examples of solutions.

<http://physioweb.med.uvm.edu/bodyfluids/osmosis.htm>

Visit this web site to learn about osmosis and its relationship to solutions.

<http://hydrodictyon.eeb.uconn.edu/people/plewis/applets/Osmosis/osmosis.html>

Visit this site for an animation and explanation of osmosis.

<http://science.howstuffworks.com/reverse-osmosis.htm>

Visit this site to learn about reverse osmosis.

<http://www.ag.ndsu.edu/pubs/h2oqual/watsys/ae1047w.htm>

Visit this site from North Dakota State University to find out what reverse osmosis is used for.

Evaluation

Review the rubric to understand how your worksheet will be evaluated.

Criteria					Points
	1	2	3	4	
Task	The task was not completed.	It appears that some effort was made to complete the task, but major ideas are missing.	The task was completed as assigned, but worksheet is not thorough.	The task was completed with great attention to detail and thorough documentation.	
Process	The process was not followed.	The research was complete, but worksheet could have been better organized.	All the steps of the process were followed and worksheet was good.	It is clear that much effort went into the project. The worksheet was thorough.	
Presentation	Presentation was sloppy and not well prepared.	The presentation included key ideas but lacked general cohesiveness.	The presentation was well organized with only minor errors.	Presentation is well organized, procedures, data, and conclusions are clearly stated.	

Conclusion

In the process of completing this WebQuest, you've become informed about solutions, solvents, solubility, and reverse osmosis. You have read information to answer questions about solutions. You've also conducted an experiment to explore the solubility of items found around school or at home. By investigating solutions, you've expanded your understanding of a fundamental part of chemistry.